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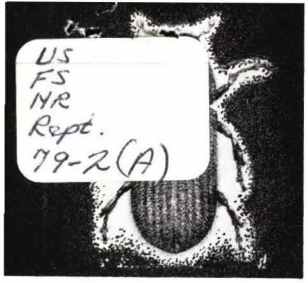

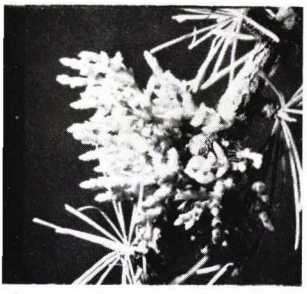

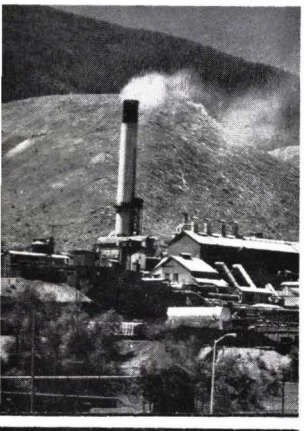

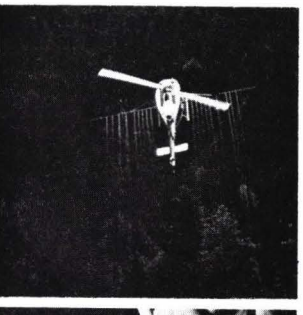

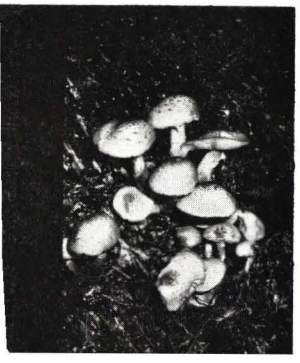

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R-1 FOREST INSECT AND DISEASE DAMAGE SURVEY SYSTEM

By

Wayne E. Bousfield, Entomologist

INTRODUCTION

The purpose of insect and disease damage surveys is to estimate losses caused by various pests, so that the land manager can prescribe appropriate management action.

Systematic ground data collection systems provide to the land manager loss data that can be used for cost benefit analysis, management plans, environmental impact statements, and for projecting losses at a forest level. Damage survey data could be integrated into timber management plans to fill voids in stand models to predict losses. This handbook describes field data collection procedures and data recording necessary to operate the supporting computer program called "INDIDS" (Insect and Disease Damage Survey).

SURVEY TYPES

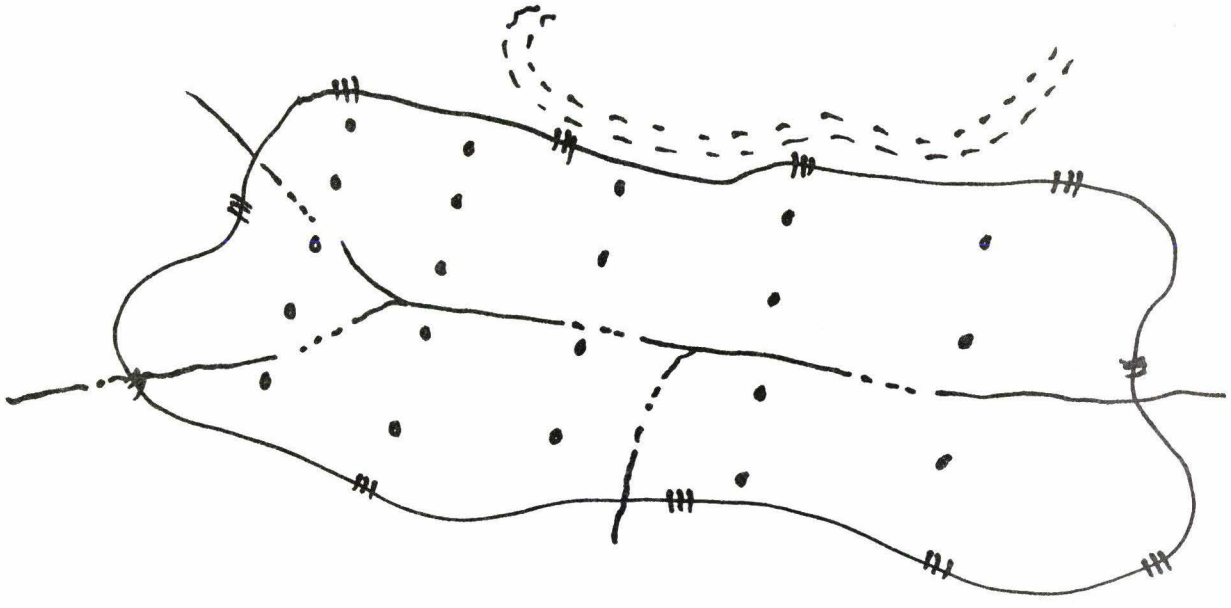
Usually, the land manager has only one specific pest in mind when conducting damage loss surveys. This system, however, provides for four basic pest types: (1) bark beetles, (2) defoliators, (3) disease, (4) miscellaneous insect and damage problems. Data can be collected for all four types at the same time if desired, but analyzed separately using the computer program "INDIDS" for the different options. The program provides detailed mensurational data of stands by species, size class, and damage class for each designated survey type and aggregates other problems in one column. Detailed statistics on other problems can be obtained by running the option desired. Each sample tree in the survey, however, is limited to three pest problems or severity.

For example, a tree could be attacked by bark beetles, have mistletoe, and be top killed by a defoliator. Another tree could be recorded as having moderate defoliation, be lightly top killed, and have root rot. This flexibility allows for several alternatives in data collection, and four options to summarize detailed statistics.

Periodic annual increment is also calculated by a growth model. If growth loss estimates caused by a defoliator are desired and the stand recently became infested, then radial growth measurements covering the period during the infestation and prior to the infestation are measured, and adjusted mean growth between host and nonhost trees is tested by covariance analysis. If differences are significant, expected periodic annual increment is computed using the growth model. Areas of chronic defoliation cannot be evaluated in this manner, however, if top kill is present, growth loss calculations are based on presence of top kill.

FIELD PROCEDURES

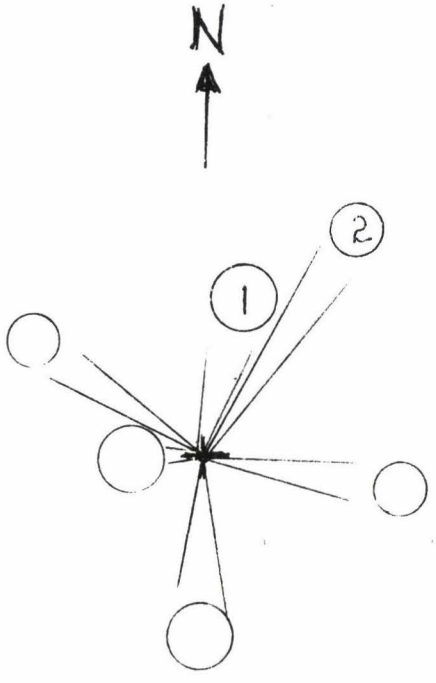
Areas examined must first be delineated into stands using standard photo interpretation (P.I.) guides explained in TM handbooks. Use existing stand delineations if the area is National Forest. Obtain either 2-inch or 2.6-inch/mile topographic maps of the area, and resource photography to transfer stand boundaries to field maps. Sample points should occur on a 5- by 10-chain grid to sample a stand satisfactorily. Stands less than 40 acres should be sampled with greater intensity depending on desired sampling error. The following diagram shows how plots could be placed in a 100-acre stand.



Because of the clumped distribution of bark beetle killed trees in a stand, sampling intensities should be greater for attacked trees than undamaged trees to obtain similar sampling errors. INDIDS provides for different sampling intensities.

When conducting bark beetle surveys, uninfested or undamaged tree information need only be taken on a sample of the total plots. However, at least 10 plots in each stand should be sampled for undamaged stand statistics. For example, if a total of 20 plots are planned for the survey then record data on all trees within the plot on the even-numbered plots, and on the odd-numbered plots record trees only if bark beetles have attacked or some other damaging agent is involved. Upon completion of the survey, record the number of plots where only unattacked trees were recorded (columns 67-68) and the total number of plots (columns 72-74). Diameters of all trees in the plot are recorded to the nearest one-tenth of an inch. Tree heights are measured to the nearest 1 foot on a sample basis. Twenty-five percent of all trees over 5 inches d.b.h. on each plot (figure 1) are measured for height. After the number of trees have been determined, select trees clockwise from north to be measured for height. A different sampling method may be incorporated to obtain height estimates.

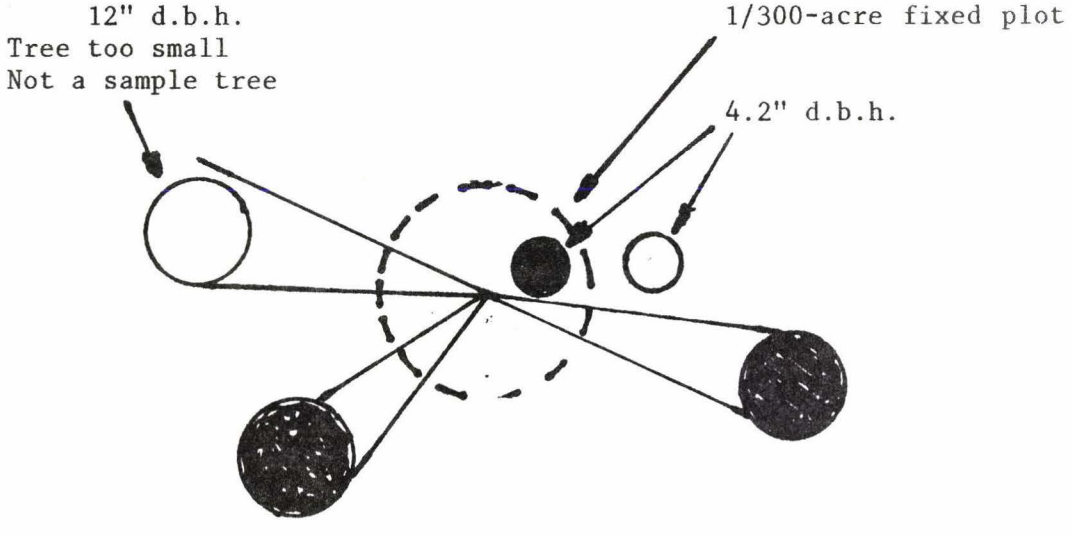
Figure 1--Height Measurements of Sample Trees

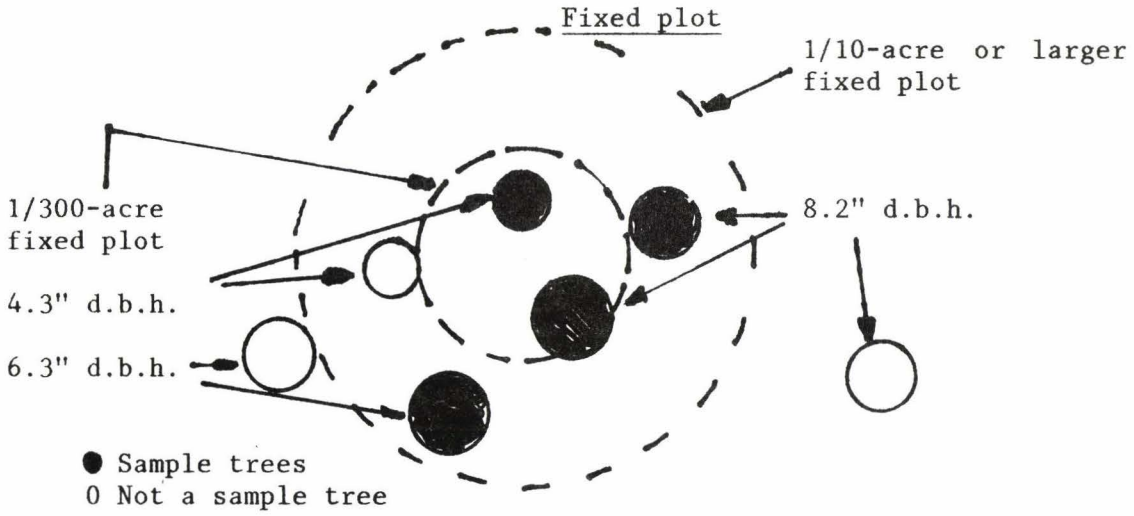


No heights are measured for trees less than 5 inches d.b.h. Regression estimates based on diameters and heights of sample trees are used to obtain heights for unmeasured trees using a log transformation of the data. If periodic increment is desired, then habitat type must be obtained for each plot, and the last 10 years' radial growth measured for each tree that was sampled for height. Ten-year radial growth is measured to nearest one-tenth inch and interpolated to the nearest one-hundredth inch. If growth loss is desired in the case of defoliators, then X-year and Y-year growth measurements on increment cores explained later must be recorded. Douglas-fir, grand fir, subalpine fir, and spruce are considered the host species when infestations of spruce budworm or tussock moth occur. No provisions are provided for the user to designate different host species, although it could be done through computer programing. Ponderosa pine, white pine, limber or lodgepole pine will be considered nonhost species for covariance testing. Larch will not be considered, because it is both a host of budworm and larch casebearer which makes it difficult to determine years infested. If nonhost species are a minor part of the forest, then measure growth of all nonhost trees on the plot.

The supporting computer program "INDIDS" will handle both variable and fixed plot sampling including strip plots. Trees less than 5 inches d.b.h. are only sampled when they occur within a 1/300-acre or 6.8-foot radius fixed plot. A maximum of four best management trees under 5 inches d.b.h. will be recorded on the 300th-acre fixed plot. Excess trees are considered culls and will not be recorded. Trees greater than 5 inches d.b.h. are sampled from either variable plot method or fixed plot of one-tenth of an acre or larger plot. The following examples explain sample tree selection.

Variable plot





RECORDING DATA FOR INDIDS

HEADER CARD

The following is an explanation of how to record sample tree data on the field data sheet (Exhibit 1).

Identification code: (1-3) Unique code which identifies header card with data cards, usually the Forest code followed by a number. For example, (Ident code 1 0 3) where 10 is the Forest code for Flathead and 3 for that particular stand. This number is used to identify cards from the same stand only.

Forest: (4-19) Alpha or numeric name of Forest, Park, Indian reservation, BLM, etc. Example F L A T H E A D

Stand or Area: (20-35) Use compartment, subcompartment, and stand number or drainage. Any combination of numeric or alpha characters that will identify the areas surveyed.

Examples 7 4 7 1 2 0 or R O C K C R E E K # 2

Survey code	(36-37)	Survey type
01	=	Bark beetle survey
02	=	Defoliator survey
03	=	Disease survey
04	=	Miscellaneous insect and damaging problems

Observers: (52-66) Names or initials of observers.

Type plot: (69)

1 = Variable plot for trees ≥5 inches d.b.h. In addition, trees <5 inches are recorded on the 1/300-acre plot.

2 = Fixed plot for trees ≥5 inches d.b.h. In addition, trees <5 inches d.b.h. are recorded on the 1/300-acre plot.

Size plot: (70-71) Enter BA factor or, 4 for ¼, 5 for 1/5 for fixed plots. Example of BAF 40 would be recorded as 4 0, or 1/5-acre fixed plot would be recorded as 0 5.

Undamaged tree plots: (67-68) Enter number plots where undamaged tree data was recorded. If undamaged tree data was recorded on all plots then undamaged tree plots would equal total plots.

Total plots: (72-74) Enter total number of plots used in sampling the stand including undamaged stand plots. Include all plots even if some had no trees.

Date: (75-80) Enter month, day, and year.

Plot cards

Ident code: (1-3) Use same as header card. Example: 1 0 3

Plot: (5-6) Plot number in sequence. Do not duplicate plot numbers within a stand. Example 0 1 for first plot.

HAB: (8-10) Habitat type for plot. Use Montana valid habitat type numbers. Example: 5 2 1 for grand fir/Clintonia uniflora phase (appendix I).

Species: (12-14) Use valid species code. Left adjusted. Appendix II.
Examples White pine W P
Larch L

D.b.h.: (16-18) Enter d.b.h. to nearest one-tenth inch right adjusted. For example, a tree 12.3 inches in diameter is recorded as 1 2 3.
Height: The height of trees sampled for height measurements is entered to the nearest foot, right adjusted.

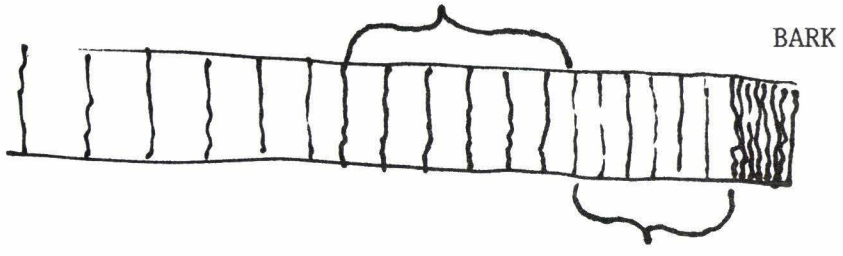
Age: (24-26) or tree number if identity is needed. Age measurements are optional (to be added later to Program).

10-year growth: (28-30) Last 10 years' radial growth in inches (two decimals assumed) right adjusted. Example of 1.05 inches 1 0 5
Example of .23 inches 2 3

Y-year growth: (32-34) Radial growth measurements for the period of infestation. Not less than 2 years and not to exceed the last 10 years (two decimals assumed, right adjusted) (figure 2).

X-year growth: (36-38) Radial growth measurement of the period of normal growth (two decimals assumed, right adjusted) (figure 3).

Figure 3


(X-year growth)
Radial growth prior to infestation for equal number of years
BARK
(Y-year growth)
Last 2-10 years radial growth (depending upon the period of infestation)

INSECT OR DISEASE CODES

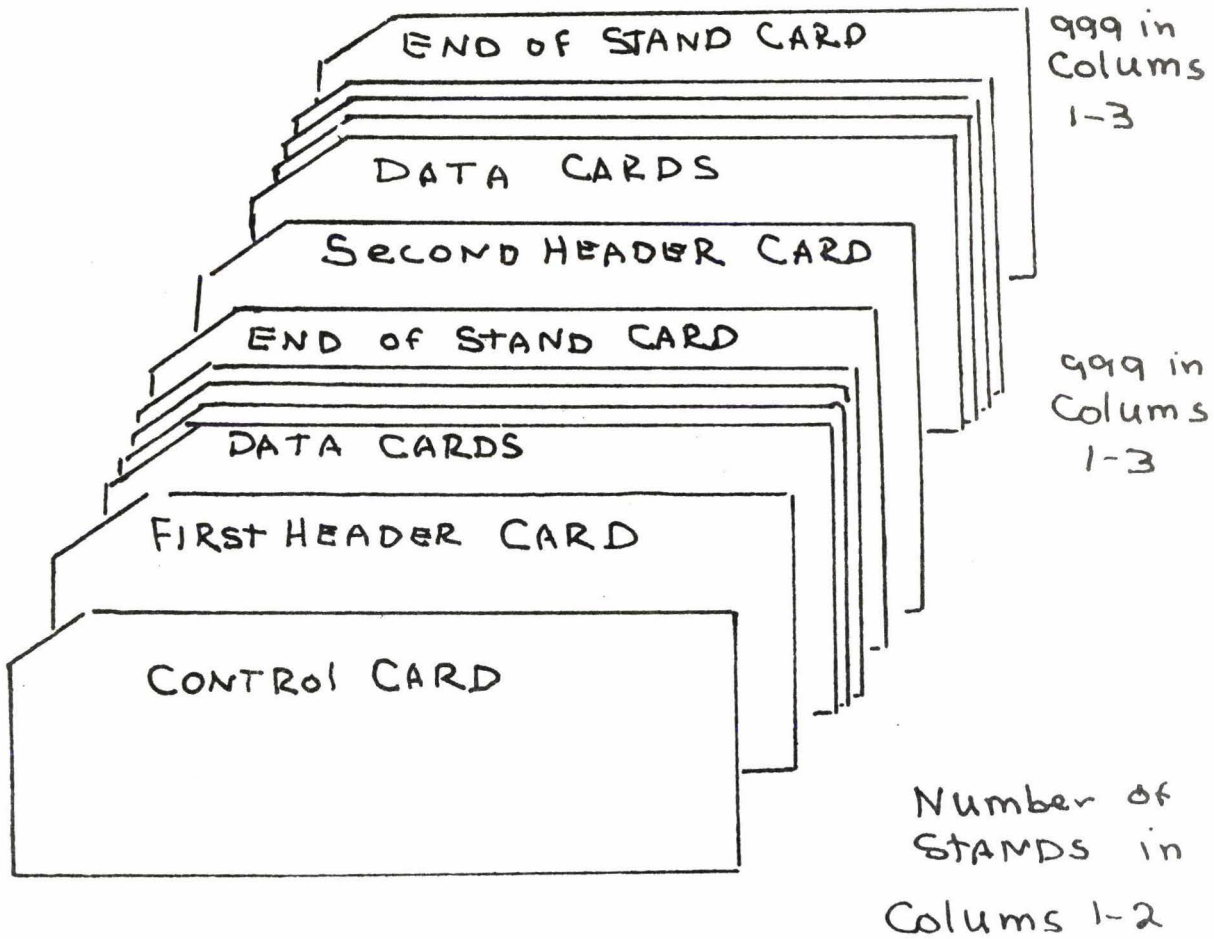
Columns: (40-47)

Examine each tree and assign a damage code to each tree. Be sure to use the 0 code if no damaging agents are found. Use only valid codes

(appendix III). Definitions of the 0 code must be placed in first column (tree is undamaged). Do not place 0 in first column (40-41) and another code in second column (43-44). It makes no difference in order of type of codes used.

INDIDS Deck Set Up for 2 Stands

A maximum of 99 stands can be run at one time. At present each stand has a limit of 400 sample trees. Exhibit 2 shows examples of output from INDIDS.



For each option INDIDS computes, the trees per acre (TA), basal area (BA), cubic foot volume per acre (CFV), board foot volume (BFV), actual periodic annual increment in cubic feet per acre per year (APAI), and expected periodic annual increment (EPAI) for each species by damage class and four diameter classes. In addition, percent of stand damaged is computed in terms of trees per acre, basal area cubic foot volume, and board foot volume. Diameter of the tree of mean basal area is calculated by species and damage class.

Appendix . --*Montana forest habitat types*

ADP code[1]	Abbreviation	Habitat types and phases: Scientific names	Common names
010	SCREE .		
000		PINUS FLEXILIS CLIMAX SERIES	
040	PIFL/AGSP h.t.	Pinus flexilis/Agropyron spicatum h.t.	limber pine/bluebunch wheatgrass
050	PIFL/FEID h.t.	Pinus flexilis/Festuca idahoensis h.t.	limber pine/Idaho fescue
051	-FEID phase	-Festuca idahoensis phase	-Idaho fescue phase
052	-FESC phase	-Festuca scabrella phase	-rough fescue phase
070	PIFL/JUCO h.t.	Pinus flexilis/Juniperus communis h.t.	limber pine/common juniper
100		PINUS PONDEROSA CLIMAX SERIES	
110	PIPO/AND h.t.[2]	Pinus ponderosa/Andropogon spp. h.t.	ponderosa pine/bluestem
130	PIPO/AGSP h.t.	Pinus ponderosa/Agropyron spicatum h.t.	ponderosa pine/bluebunch wheatgrass
140	PIPO/FEID h.t.	Pinus ponderosa/Festuca idahoensis h.t.	ponderosa pine/Idaho fescue
141	-FEID phase	-Festuca idahoensis phase	-Idaho fescue phase
142	-FESC phase	-Festuca scabrella phase	-rough fescue phase
160	PIPO/PUTR h.t.	Pinus ponderosa/Purshia tridentata h.t.	ponderosa pine/bitterbrush
161	-AGSP phase	-Agropyron spicatum phase	-bluebunch wheatgrass phase
162	-FEID phase	-Festuca idahoensis phase	-Idaho fescue phase
170	PIPO/SYAL h.t.	Pinus ponderosa/Symphoricarpos albus h.t.	ponderosa pine/snowberry
171	-SYAL phase	-Symphoricarpos albus phase	-snowberry phase
172	-BERE phase	-Berberis repens phase	-creeping oregon grape phase
180	PIPO/PRVI h.t.	Pinus ponderosa/Prunus virginiana h.t.	ponderosa pine/chokecherry
181	-PRVI phase	-Prunus virginiana phase	-chokecherry phase
182	-SHCA phase	-Shepherdia canadensis phase	-buffaloberry phase
200		PSEUDOTSUGA MENZIESII CLIMAX SERIES	
210	PSME/AGSP h.t.	Pseudotsuga menziesii/Agropyron spicatum h.t.	Douglas-fir/bluebunch wheatgrass
220	PSME/FEID h.t.	Pseudotsuga menziesii/Festuca idahoensis h.t.	Douglas-fir/Idaho fescue
230	PSME/FESC h.t.	Pseudotsuga menziesii/Festuca scabrella h.t.	Douglas-fir/rough fescue
250	PSME/VACA h.t.	Pseudotsuga menziesii/Vaccinium caespitosum h.t.	Douglas-fir/dwarf huckleberry
260	PSME/PHMA h.t.	Pseudotsuga menziesii/Physocarpus malvaceus h.t.	Douglas-fir/ninebark
261	-PHMA phase	-Physocarpus malvaceus phase	-ninebark phase
262	-CARU phase	-Calamagrostis rubescens phase	-pinegrass phase
280	PSME/VAGL h.t.	Pseudotsuga menziesii/Vaccinium globulare h.t.	Douglas-fir/blue huckleberry
281	-VAGL phase	-Vaccinium globulare phase	-blue huckleberry phase
282	-ARUV phase	-Arctostaphylos uva-ursi phase	-kinnikinnick phase
283	-XETE phase	-Xerophyllum tenax phase	-beargrass phase
290	PSME/LIBO h.t.	Pseudotsuga menziesii/Linnaea borealis h.t.	Douglas-fir/twinflower
291	-SYAL phase	-Symphoricarpos albus phase	-snowberry phase
292	-CARU phase	-Calamagrostis rubescens phase	-pinegrass phase
293	-VAGL phase	-Vaccinium globulare phase	-blue huckleberry phase
310	PSME/SYAL h.t.	Pseudotsuga menziesii/Symphoricarpos albus h.t.	Douglas-fir/snowberry
311	-AGSP phase	-Agropyron spicatum phase	-bluebunch wheatgrass phase
312	-CARU phase	-Calamagrostis rubescens phase	-pinegrass phase
313	-SYAL phase	-Symphoricarpos albus phase	-snowberry phase
320	PSME/CARU h.t.	Pseudotsuga menziesii/Calamagrostis rubescens h.t.	Douglas-fir/pinegrass
321	-AGSP phase	-Agropyron spicatum phase	-bluebunch wheatgrass phase
322	-ARUV phase	-Arctostaphylos uva-ursi phase	-kinnikinnick phase
323	-CARU phase	-Calamagrostis rubescens phase	-pinegrass phase
324	-PIPO phase	-Pinus ponderosa phase	-ponderosa pine phase
330	PSME/CAGE h.t.	Pseudotsuga menziesii/Carex geyeri h.t.	Douglas-fir/elk sedge
340	PSME/SPBE h.t.	Pseudotsuga menziesii/Spiraea betulifolia h.t.	Douglas-fir/white spiraea
350	PSME/ARUV h.t.	Pseudotsuga menziesii/Arctostaphylos uva-ursi h.t.	Douglas-fir/kinnikinnick
360	PSME/JUCO h.t.	Pseudotsuga menziesii/Juniperus communis h.t.	Douglas-fir/common juniper
370	PSME/ARCO h.t.	Pseudotsuga menziesii/Arnica cordifolia h.t.	Douglas-fir/heartleaf arnica
380	PSME/SYOR h.t.[2]	Pseudotsuga menziesii/Symphoricarpos oreophilus h.t.	Douglas-fir/mountain snowberry
400		PICEA CLIMAX SERIES	
410	PICEA/EQAR h.t.	Picea/Equisetum arvense h.t.	spruce/common horsetail
420	PICEA/CLUN h.t.	Picea/Clintonia uniflora h.t.	spruce/queencup beadlily
421	-VACA phase	-Vaccinium caespitosum phase	-dwarf huckleberry phase
422	-CLUN phase	-Clintonia uniflora phase	-queencup beadlily phase
430	PICEA/PHMA h.t.	Picea/Physocarpus malvaceus h.t.	spruce/ninebark
440	PICEA/GATR h.t.	Picea/Galium triflorum h.t.	spruce/sweetscented bedstraw
450	PICEA/VACA h.t.	Picea/Vaccinium caespitosum h.t.	spruce/dwarf huckleberry
460	PICEA/SEST h.t.	Picea/Senecio streptanthifolius h.t.	spruce/cleft-leaf groundsel
461	-PSME phase	-Pseudotsuga menziesii phase	-Douglas-fir phase
462	-PICEA phase	-Picea phase	-spruce phase
470	PICEA/LIBO h.t.	Picea/Linnaea borealis h.t.	spruce/twinflower
480	PICEA/SMST h.t.	Picea/Smilacina stellata h.t.	spruce/starry Solomon's seal
500		ABIES GRANDIS CLIMAX SERIES	
510	ABGR/XETE h.t.	Abies grandis/Xerophyllum tenax h.t.	grand fir/beargrass
520	ABGR/CLUN h.t.	Abies grandis/Clintonia uniflora h.t.	grand fir/queencup beadlily
521	-CLUN phase	-Clintonia uniflora phase	-queencup beadlily phase
522	-ARNU phase	Aralia nudicaulis phase	-wild sarsaparilla phase
523	-XETE phase	-Xerophyllum tenax phase	-beargrass phase
590	ABGR/LIBO h.t.	Abies grandis/Linnaea borealis h.t.	grand fir/twinflower
591	-LIBO phase	-Linnaea borealis phase	-twinflower phase
592	-XETE phase	-Xerophyllum tenax phase	-beargrass phase

Appendix 1 continued

ADP code[1]	Abbreviation	Habitat types and phases: Scientific names	Common names
501		THUJA PLICATA CLIMAX SERIES	
530	THPL/CLUN h.t.	Thuja plicata/Clintonia uniflora h.t.	western redcedar/queencup beadlily
531	-CLUN phase	-Clintonia uniflora phase	-queencup beadlily phase
532	-ARNU phase	-Aralia nudicaulis phase	-wild sarsaparilla phase
533	-MEFE phase	-Menziesia ferruginea phase	-menziesia phase
550	THPL/OPHO h.t.	Thuja plicata/Oplopanax horridum h.t	western redcedar/devil's club
502		TSUGA HETEROPHYLLA CLIMAX SERIES	
570	TSHE/CLUN h.t.	Tsuga heterophylla/Clintonia uniflora h.t.	western hemlock/queencup beadlily
571	-CLUN phase	-Clintonia uniflora phase	-queencup beadlily phase
572	-ARNU phase	-Aralia nudicaulis phase	-wild sarsaparilla phase
600		ABIES LASIOCARPA CLIMAX SERIES	
700		Lower subalpine h.t.s	
610	ABLA/OPHO h.t.	Abies lasiocarpa/Oplopanax horridum h.t.	subalpine fir/devil's club
620	ABLA/CLUN h.t.	Abies lasiocarpa/Clintonia uniflora h.t.	subalpine fir/queencup beadlily
621	-CLUN phase	-Clintonia uniflora phase	-queencup beadlily phase
622	-ARNU phase	-Aralia nudicaulis phase	-wild sarsaparilla phase
623	-VACA phase	-Vaccinium caespitosum phase	-dwarf huckleberry phase
624	-XETE phase	-Xerophyllum tenax phase	-beargrass phase
625	-MEFE phase	-Menziesia ferruginea phase	-menziesia phase
630	ABLA/GATR h.t.	Abies lasiocarpa/Galium triflorum h.t.	subalpine fir/sweetscented bedstraw
640	ABLA/VACA h.t.	Abies lasiocarpa/Vaccinium caespitosum h.t.	subalpine fir/dwarf huckleberry
650	ABLA/CACA h.t.	Abies lasiocarpa/Calamagrostis canadensis h.t.	subalpine fir/bluejoint
651	-CACA phase	-Calamagrostis canadensis phase	-bluejoint phase
653	-GATR phase	-Galium triflorum phase	-sweetscented bedstraw phase
654	-VACA phase	-Vaccinium caespitosum phase	-dwarf huckleberry phase
660	ABLA/LIBO h.t.	Abies lasiocarpa/Linnaea borealis h.t.	subalpine fir/twinflower
661	-LIBO phase	-Linnaea borealis phase	-twinflower phase
662	-XETE phase	-Xerophyllum tenax phase	-beargrass phase
663	-VASC phase	-Vaccinium scoparium phase	-grouse whortleberry phase
670	ABLA/MEFE h.t.	Abies lasiocarpa/Menziesia ferruginea h.t.	subalpine fir/menziesia
680	TSME/MEFE h.t.	Tsuga mertensiana/Menziesia ferruginea h.t.	mountain hemlock/menziesia
690	ABLA/XETE h.t.	Abies lasiocarpa/Xerophyllum tenax h.t.	subalpine fir/beargrass
691	-VAGL phase	-Vaccinium globulare phase	-blue huckleberry phase
692	-VASC phase	-Vaccinium scoparium phase	-grouse whortleberry phase
710	TSME/XETE h.t.	Tsuga mertensiana/Xerophyllum tenax h.t.	mountain hemlock/beargrass
720	ABLA/VAGL h.t.	Abies lasiocarpa/Vaccinium globulare h.t.	subalpine fir/blue huckleberry
730	ABLA/VASC h.t.	Abies lasiocarpa/Vaccinium scoparium h.t.	subalpine fir/grouse whortleberry
731	-CARU phase	-Calamagrostis rubescens phase	-pinegrass phase
732	-VASC phase	-Vaccinium scoparium phase	-grouse whortleberry phase
733	-THOC phase	-Thalictrum occidentale phase	-western meadowrue phase
740	ABLA/ALSI h.t.	Abies lasiocarpa/Alnus sinuata h.t.	subalpine fir/Sitka alder
760	ABLA/CARU h.t.	Abies lasiocarpa/Calamagrostis rubescens h.t.	subalpine fir/pinegrass
770	ABLA/CLPS h.t.	Abies lasiocarpa/Clematis pseudoalpina h.t.	subalpine fir/virgin's bower
780	ABLA/ARCO h.t.	Abies lasiocarpa/Arnica cordifolia h.t.	subalpine fir/heartleaf arnica
790	ABLA/CAGE h.t.[2]	Abies lasiocarpa/Carex geyeri h.t.	subalpine fir/elk sedge
791	-CAGE phase	-Carex geyeri phase	-elk sedge phase
792	-PSME phase	-Pseudotsuga menziesii phase	-Douglas-fir phase
800		Upper subalpine h.t.s	
810	ABLA/RIMO h.t.[2]	Abies lasiocarpa/Ribes montigenum h.t.	subalpine fir/mountain gooseberry
820	ABLA-PIAL/VASC h.t.	Abies lasiocarpa-Pinus albicaulis/Vaccinium scoparium h.t.	subalpine fir-whitebark pine/grouse whortleberry
830	ABLA/LUHI	Abies lasiocarpa/Luzula hitchcockii h.t.	subalpine fir/smooth wood-rush
831	-VASC phase	-Vaccinium scoparium phase	-grouse whortleberry phase
832	-MEFE phase	-Menziesia ferruginea phase	-menziesia phase
840	TSME/LUHI h.t.[2]	Tsuga mertensiana/Luzula hitchcockii h.t.	mountain hemlock/smooth wood-rush
841	-VASC phase	-Vaccinium scoparium phase	-grouse whortleberry phase
842	-MEFE phase	-Menziesia ferruginea phase	-menziesia phase
890		Timberline h.t.s	
850	PIAL-ABLA h.t.s	Pinus albicaulis-Abies lasiocarpa h.t.s	whitebark pine-subalpine fir
860	LALY-ABLA h.t.s	Larix lyallii-Abies lasiocarpa h.t.s	alpine larch-subalpine fir
870	PIAL h.t.s	Pinus albicaulis h.t.s	whitebark pine
900		PINUS CONTORTA CLIMAX SERIES	
910	PICO/PUTR h.t.	Pinus contorta/Purshia tridentata h.t.	lodgepole pine/bitterbrush
920	PICO/VACA c.t.	Pinus contorta/Vaccinium caespitosum c.t.	lodgepole pine/dwarf huckleberry
930	PICO/LIBO c.t.	Pinus contorta/Linnaea borealis c.t.	lodgepole pine/twinflower
940	PICO/VASC c.t.	Pinus contorta/Vaccinium scoparium c.t.	lodgepole pine/grouse whortleberry
950	PICO/CARU c.t.	Pinus contorta/Calamagrostis rubescens c.t.	lodgepole pine/pinegrass

Total Number of Habitat Types = 64

Total Number of Habitat Types, Phase, and Pinus contorta Community Type Categories = 105

[1] Automatic data processing codes for National Forest System use.
[2] Minor type in Montana; described in other study areas.

APPENDIX II

Species Codes

GF	=	Grand fir
AF or SAF	=	Subalpine fir
J	=	Juniper
L or WL	=	Larch
S	=	Spruce
WBL, WBP, WLP,	=	White bark or limber pine
LP or LPP	=	Lodgepole pine
WP	=	Western white pine
PP	=	Ponderosa pine
DF	=	Douglas-fir
Y	=	Yew
C or WRC	=	Western redcedar
WH or H	=	Western hemlock
MH	=	Mountain hemlock
B	=	Birch
ASH	=	Ash
CW	=	Cottonwood
ASP	=	Aspen
OH	=	Other hardwoods
AL	=	Alpine larch

APPENDIX III

Damage Codes

Code	
0	Healthy tree, no insect, disease, or damage problem
1	Unknown or natural mortality

Bark Beetles

2	Current beetle attack
3	Last year's attack
4	Older attack
5	Unsuccessful attack
6	Current strip attack
7	Older strip attack
8	Current secondary bark beetle attack
9	Older secondary bark beetle attack

Defoliation

11	Light defoliation
12	Moderate defoliation
13	Heavy defoliation
14	Light top kill
15	Moderate top kill
16	Heavy top kill
17	Defoliator caused mortality

Disease

20	Mistletoe infected
21	Mistletoe mortality
22	Root rot infected
23	Current root rot mortality
24	Older root rot mortality
25	Branch canker and stem rust
26	Stem canker and stem rust
27	Mortality - stem rust
28	Light needle disease infection
29	Moderate needle disease infection
30	Heavy needle disease infection
31	Butt and stem decay

OTHER INSECT AND DAMAGING PROBLEMS

40 Shoot damaging insects
41 Stem boorers
42 Gall insects
43 Sucking insects (aphids and scales)
44 Webworms
45 Light winter damage
46 Moderate winter damage
47 Heavy winter damage
48 Animal damage
49 Spike tops
50 Other damaging agents

EXHIBIT 1 - FOREST INSECT AND DISEASE DAMAGE SURVEY

Ident. code ____ (1-3)

Forest ____ (4-19)

Slope _____ Aspect _____ Elev _____

Stand or Area ____ (20-35)

Type plot ____ (69)

Physo Site _____

Survey code ____ (36-37)

Size plot ____ (70-71)

Hab _____

Type ____ (38-51)

Soil _____

Observers ____ (52-66)

Green tree plots ____ (67-68)

Total plots ____ (72-74)

Date ____ (75-76) ____ (77-78) ____ (79-80)

Ident. code (1-3)	Plot (5-6)	HAB (8-10)	Species (12-14)	D.b.h. (16-18)	Height (20-22)	Age (24-26)	10-yr. growth (28-30)	(32-34)	(36-38)	Insect or disease codes (40-41)	(43-44)	(46-47)

FOREST _____

STAND _____

FOREST INSECT AND DISEASE DAMAGE SURVEY

Ident. code (1-5)	Plot (5-6)	HAB (8-10)	Species (12-14)	D.b.h. (16-18)	Height (20-22)	Age (24-26)	10-yr. growth (28-30)	_____ (32-34)	_____ (36-38)	Insect or disease codes (40-41)	(43-44)	(46-47)

Exhibit 2. - BARK BEETLE SURVEY
--SPECIES TOTAL--

3/20/80

80 TEST 1 100

DIAMETER CLASS		UNDAM. STAND	CUR. ATTACK	LAST YEAR'S ATTACK	OLDER ATTACK	UNSUC. ATTACK	CUR. STRIP ATTACK	OLDER STRIP ATTACK	CUR. SEC. ATTACK	OLDER SEC. ATTACK	OTHER I+D PROB.	OTHER DAM. AGENTS	OTHER MORT.	STAND TOTAL
	TA	300.0	.0	.0	.0	.0	.0	.0	.0	.0	200.0	.0	.0	500.0
0- 4.9	BA	.0	.0	.0	.0	.0	.0	.0	.0	.0	25.1	.0	.0	25.1
	TA	168.6	.0	.0	.0	.0	.0	.0	.0	.0	116.5	.0	.0	275.1
	BA	40.0	.0	.0	.0	.0	.0	.0	.0	.0	26.7	.0	.0	66.7
5- 8.9	CFA	703.3	.0	.0	.0	.0	.0	.0	.0	.0	289.0	.0	.0	992.3
	BFA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	APAI	64.9	.0	.0	.0	.0	.0	.0	.0	.0	21.1	.0	.0	76.0
	EPAI	64.9	.0	.0	.0	.0	.0	.0	.0	.0	25.6	.0	.0	80.5
	TA	21.8	21.8	.0	.0	.0	.0	.0	.0	.0	85.1	.0	21.8	128.6
	BA	13.3	13.3	.0	.0	.0	.0	.0	.0	.0	53.3	.0	13.3	80.0
9-11.9	CFA	374.1	357.9	.0	.0	.0	.0	.0	.0	.0	1466.0	.0	307.1	2147.2
	BFA	1743.7	1655.1	.0	.0	.0	.0	.0	.0	.0	6476.1	.0	1125.7	9345.5
	APAI	14.3	.0	.0	.0	.0	.0	.0	.0	.0	34.3	.0	.0	48.6
	EPAI	14.3	11.0	.0	.0	.0	.0	.0	.0	.0	45.3	.0	.0	59.6
	TA	9.3	.0	15.4	.0	.0	.0	.0	.0	.0	38.5	9.3	15.4	76.6
	BA	13.3	.0	13.3	.0	.0	.0	.0	.0	.0	53.3	13.3	13.3	93.3
12 +	CFA	409.5	.0	448.4	.0	.0	.0	.0	.0	.0	1783.7	409.5	398.3	3040.0
	BFA	2048.8	.0	2238.0	.0	.0	.0	.0	.0	.0	9094.1	2048.8	1872.7	15253.6
	APAI	6.1	.0	.0	.0	.0	.0	.0	.0	.0	21.8	4.0	.0	27.8
	EPAI	10.6	.0	11.0	.0	.0	.0	.0	.0	.0	34.0	7.1	.0	55.6
	TA	489.7	21.8	15.4	.0	.0	.0	.0	.0	.0	440.0	9.3	37.2	982.2
	BA	66.7	13.3	13.3	.0	.0	.0	.0	.0	.0	158.5	13.3	26.7	265.1
TOTALS	CFA	1486.9	357.9	448.4	.0	.0	.0	.0	.0	.0	3538.7	409.5	705.4	6179.5
	BFA	9792.4	1655.1	2238.0	.0	.0	.0	.0	.0	.0	15570.2	2048.8	2998.5	24599.2
	APAI	75.3	.0	.0	.0	.0	.0	.0	.0	.0	77.2	4.0	.0	152.5
	EPAI	79.9	11.0	11.0	.0	.0	.0	.0	.0	.0	104.9	7.1	.0	195.8

TA = Trees per acre
BA = Basal area
CFA = Cubic ft. volume per acre
BFA = Board ft volume per acre

APAI = Actual periodic annual increment
EPAI = Expected periodic annual increment
(PAI) Cubic foot production per acre per year without damage

Exhibit 2 continued

BARK BEETLE SURVEY
---SPECIES LP ---

3/20/80

RO TEST 1 100

DIAMETER CLASS		UNCAM. STAND	CUR. ATTACK	LAST YEAR'S ATTACK	OLDER ATTACK	UNSUC. ATTACK	CUR. STRIP ATTACK	OLDER STRIP ATTACK	CUR. SEC. ATTACK	OLDER SEC. ATTACK	OTHER I+D PROB.	OTHER DAM. AGENTS	OTHER MORT.	STAND TOTAL
	TA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
0- 4.9	BA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	TA	105.7	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	105.7
	BA	26.7	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	26.7
5- 8.9	PPA	564.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	564.0
	RPA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	APAI	40.7	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	40.7
	EPAI	40.7	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	40.7
	TA	21.8	21.8	.0	.0	.0	.0	.0	.0	.0	21.8	.0	.0	43.5
	BA	13.3	13.3	.0	.0	.0	.0	.0	.0	.0	13.3	.0	.0	26.7
9-11.9	PPA	374.1	357.9	.0	.0	.0	.0	.0	.0	.0	357.9	.0	.0	731.9
	RPA	1743.7	1655.1	.0	.0	.0	.0	.0	.0	.0	1655.1	.0	.0	3398.7
	APAI	14.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.3
	EPAI	14.3	11.0	.0	.0	.0	.0	.0	.0	.0	11.0	.0	.0	25.3
	TA	.0	.0	15.4	.0	.0	.0	.0	.0	.0	.0	.0	.0	15.4
	BA	.0	.0	13.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.3
12 +	PPA	.0	.0	448.4	.0	.0	.0	.0	.0	.0	.0	.0	.0	448.4
	RPA	.0	.0	2238.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	2238.0
	APAI	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	EPAI	.0	.0	11.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	11.0
	TA	127.5	21.8	15.4	.0	.0	.0	.0	.0	.0	21.8	.0	.0	164.6
	BA	40.0	13.3	13.3	.0	.0	.0	.0	.0	.0	13.3	.0	.0	66.7
TOTALS	PPA	938.0	357.9	448.4	.0	.0	.0	.0	.0	.0	357.9	.0	.0	1744.3
	RPA	1743.7	1655.1	2238.0	.0	.0	.0	.0	.0	.0	1655.1	.0	.0	5636.8
	APAI	55.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	55.0
	EPAI	55.0	11.0	11.0	.0	.0	.0	.0	.0	.0	11.0	.0	.0	77.0

Exhibit 2 continued

DIAMETER OF THE TREE OF MEAN BASAL AREA BY DAMAGE CLASS 3/20/80

PO TEST 1 100

SPECIES	UNDAM. STAND	CUR. ATTACK	LAST YEAR'S ATTACK	OLDER ATTACK	UNSUC. ATTACK	CUR. STRIP ATTACK	OLDER STRIP ATTACK	CUR. SEC. ATTACK	OLDER SEC. ATTACK	OTHER I+D PROB.	OTHER DAM. AGENTS	OTHER MORT.	STAND TOTAL
GF	.0	.0	.0	.0	.0	.0	.0	.0	.0	19.2	.0	.0	19.2
AF	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
J	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
L	.0	.0	.0	.0	.0	.0	.0	.0	.0	9.8	.0	.0	9.8
S	.1	.0	.0	.0	.0	.0	.0	.0	.0	9.4	.0	.0	6.3
WLP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
LP	7.6	10.6	12.6	.0	.0	.0	.0	.0	.0	10.6	.0	.0	8.6
WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	11.9	.0	12.6	12.2
PP	6.8	.0	.0	.0	.0	.0	.0	.0	.0	4.8	.0	.0	5.6
DF	3.4	.0	.0	.0	.0	.0	.0	.0	.0	7.2	16.2	10.6	5.9
Y	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
C	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
WH	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
MH	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
R	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
ASH	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
CW	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
ASP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
OH	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
AL	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	5.0	10.6	12.6	.0	.0	.0	.0	.0	.0	8.1	16.2	11.5	7.0

CROWN COMPETITION FACTOR = 322.9861

Exhibit 2 continued

BARK BEETLE SURVEY
--SPECIES TOTAL--

3/20/80

FO TEST 1 100

DIAMETER CLASS		UNDAM. STAND	CUR. ATTACK	LAST YEAR'S ATTACK	OLDER ATTACK	UNSUC. ATTACK	CUR. STRIP ATTACK	OLDER STRIP ATTACK	CUR. SEC. ATTACK	OLDER SEC. ATTACK	OTHER I+D PROB.	OTHER DAM. AGENTS	OTHER MORT.	STAND TOTAL
0- 2.9	TA	300.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	300.0
	BA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
3- 4.9	TA	.0	.0	.0	.0	.0	.0	.0	.0	.0	200.0	.0	.0	200.0
	BA	.0	.0	.0	.0	.0	.0	.0	.0	.0	25.1	.0	.0	25.1
5- 6.9	TA	125.5	.0	.0	.0	.0	.0	.0	.0	.0	116.5	.0	.0	242.0
	BA	26.7	.0	.0	.0	.0	.0	.0	.0	.0	26.7	.0	.0	53.3
	CFA	356.1	.0	.0	.0	.0	.0	.0	.0	.0	289.0	.0	.0	645.1
7- 8.9	TA	33.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	33.1
	BA	13.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.3
	CFA	347.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	347.2
9-10.9	TA	21.8	21.8	.0	.0	.0	.0	.0	.0	.0	67.8	.0	21.8	111.3
	BA	13.3	13.3	.0	.0	.0	.0	.0	.0	.0	40.0	.0	13.3	66.7
	CFA	374.1	357.9	.0	.0	.0	.0	.0	.0	.0	1014.9	.0	307.1	1696.1
11-12.9	TA	.0	.0	15.4	.0	.0	.0	.0	.0	.0	17.3	.0	15.4	48.1
	BA	.0	.0	13.3	.0	.0	.0	.0	.0	.0	13.3	.0	13.3	40.0
	CFA	.0	.0	448.4	.0	.0	.0	.0	.0	.0	451.1	.0	398.3	1297.6
13-14.9	TA	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.2	.0	.0	13.2
	BA	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.3	.0	.0	13.3
	CFA	.0	.0	.0	.0	.0	.0	.0	.0	.0	388.7	.0	.0	388.7
15-16.9	TA	9.3	.0	.0	.0	.0	.0	.0	.0	.0	18.6	9.3	.0	27.9
	BA	13.3	.0	.0	.0	.0	.0	.0	.0	.0	26.7	13.3	.0	40.0
	CFA	409.5	.0	.0	.0	.0	.0	.0	.0	.0	890.1	409.5	.0	1299.6
17-18.9	TA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	BA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	CFA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19 +	TA	.0	.0	.0	.0	.0	.0	.0	.0	.0	6.6	.0	.0	6.6
	BA	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.3	.0	.0	13.3
	CFA	.0	.0	.0	.0	.0	.0	.0	.0	.0	504.9	.0	.0	504.9
TOTALS	TA	489.7	21.8	15.4	.0	.0	.0	.0	.0	.0	440.0	9.3	37.2	982.2
	BA	66.7	13.3	13.3	.0	.0	.0	.0	.0	.0	158.5	13.3	26.7	265.1
	CFA	1486.9	357.9	448.4	.0	.0	.0	.0	.0	.0	3538.7	409.5	705.4	6179.5

Exhibit 2 continued

DEFOLIATOR SURVEY
--SPECIES TOTAL--

3/20/80

#0 TEST 1 100

DIAMETER CLASS		UNDAM. STAND	LIGHT DEF.	MOD. DEF.	HEAVY DEF.	LIGHT TOP KILL	MOD. TOP KILL	HEAVY TOP KILL	DEF. MORT.	OTHER I+D PROB.	OTHER MORT.	OTHER DAM. AGENTS	STAND TOTAL
	TA	300.0	.0	.0	100.0	.0	.0	.0	.0	100.0	.0	.0	500.0
0- 4.9	BA	.0	.0	.0	12.6	.0	.0	.0	.0	12.6	.0	.0	25.1
	TA	158.6	.0	.0	.0	63.6	.0	.0	.0	116.5	.0	.0	275.1
	BA	40.0	.0	.0	.0	13.3	.0	.0	.0	26.7	.0	.0	66.7
5- 8.9	CFA	703.3	.0	.0	.0	111.4	.0	.0	.0	289.0	.0	.0	992.3
	BFA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	APAI	54.9	.0	.0	.0	6.0	.0	.0	.0	21.1	.0	.0	76.0
	EPAI	54.9	.0	.0	.0	10.5	.0	.0	.0	25.6	.0	.0	80.5
	TA	21.8	.0	20.6	.0	.0	.0	.0	.0	85.1	.0	21.8	128.6
	BA	13.3	.0	13.3	.0	.0	.0	.0	.0	53.3	.0	13.3	80.0
9-11.9	CFA	374.1	.0	376.3	.0	.0	.0	.0	.0	1466.0	.0	307.1	2147.2
	BFA	1743.7	.0	1723.3	.0	.0	.0	.0	.0	6476.1	.0	1125.7	9345.5
	APAI	14.3	.0	11.0	.0	.0	.0	.0	.0	34.3	.0	.0	48.6
	EPAI	14.3	.0	11.0	.0	.0	.0	.0	.0	45.3	.0	.0	59.6
	TA	9.3	.0	.0	9.3	22.5	.0	6.6	.0	44.6	9.3	15.4	78.6
	BA	13.3	.0	.0	13.3	26.7	.0	13.3	.0	53.3	13.3	13.3	93.3
12 +	CFA	409.5	.0	.0	409.5	798.3	.0	504.9	.0	1822.6	409.5	398.3	3040.0
	BFA	2048.8	.0	.0	2048.8	3871.7	.0	2776.6	.0	9283.4	2048.8	1672.7	15253.6
	APAI	6.1	.0	.0	4.0	9.7	.0	4.3	.0	17.7	4.0	.0	27.8
	EPAI	10.6	.0	.0	7.1	17.0	.0	9.2	.0	37.9	7.1	.0	55.6
	TA	489.7	.0	20.6	109.3	86.1	.0	6.6	.0	346.1	9.3	37.2	982.2
	BA	66.7	.0	13.3	25.9	40.0	.0	13.3	.0	145.9	13.3	26.7	265.1
TOTALS	CFA	1486.9	.0	376.3	409.5	909.6	.0	504.9	.0	3577.6	409.5	705.4	6179.5
	BFA	3792.4	.0	1723.3	2048.8	3871.7	.0	2776.6	.0	15759.5	2048.8	2998.5	24599.2
	APAI	75.3	.0	11.0	4.0	15.7	.0	4.3	.0	73.1	4.0	.0	152.5
	EPAI	79.9	.0	11.0	7.1	27.5	.0	9.2	.0	108.8	7.1	.0	195.8

Exhibit 2 continued

DISEASE SURVEY
SPECIES TOTAL

3/20/80

RO TEST 1 100

DIAMETER CLASS		UNDAM. STAND	MIS. INF.	MIS. MORT.	ROOT ROT INF.	CUR. ROOT ROT MORT.	OLDER ROOT ROT MORT.	BRANCH CANKER	STEM CANKER	STEM RUST MORT.	LIGHT NEEDLE DIS.	MOD. NEEDLE DIS.	HEAVY NEEDLE DIS.	BUTT, STEM DECAY	OTHER I+D PROB.	OTHER DAM. AGENTS	OTHER MORT.	STAND TOTAL
	TA	300.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	200.0	.0	.0	500.0
0- 4.9	BA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	25.1	.0	.0	25.1
	TA	156.6	63.6	.0	.0	.0	.0	.0	.0	.0	63.6	.0	.0	.0	116.5	.0	.0	275.1
	BA	40.0	13.3	.0	.0	.0	.0	.0	.0	.0	13.3	.0	.0	.0	26.7	.0	.0	66.7
5- 8.9	CFA	703.3	111.4	.0	.0	.0	.0	.0	.0	.0	111.4	.0	.0	.0	289.0	.0	.0	992.3
	RFA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	APAI	54.9	6.0	.0	.0	.0	.0	.0	.0	.0	6.0	.0	.0	.0	21.1	.0	.0	76.0
	EPAI	54.9	10.5	.0	.0	.0	.0	.0	.0	.0	10.5	.0	.0	.0	25.6	.0	.0	80.5
	TA	21.8	21.8	.0	.0	.0	.0	39.0	17.3	.0	.0	25.5	.0	.0	42.3	.0	21.8	128.6
	BA	13.3	13.3	.0	.0	.0	.0	26.7	13.3	.0	.0	13.3	.0	.0	26.7	.0	13.3	80.0
9-11.9	CFA	374.1	357.9	.0	.0	.0	.0	808.9	451.1	.0	.0	280.8	.0	.0	734.1	.0	307.1	2147.2
	RFA	1743.7	1655.1	.0	.0	.0	.0	3780.6	2125.6	.0	.0	972.2	.0	.0	3378.4	.0	1125.7	9345.5
	APAI	14.3	.0	.0	.0	.0	.0	12.6	12.6	.0	.0	10.7	.0	.0	11.0	.0	.0	48.6
	EPAI	14.3	11.0	.0	.0	.0	.0	23.6	12.6	.0	.0	10.7	.0	.0	22.0	.0	.0	59.6
	TA	9.3	13.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	6.6	53.9	9.3	15.4	78.6
	BA	13.3	13.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.3	66.7	13.3	13.3	93.3
12 +	CFA	409.5	388.7	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	504.9	2232.1	409.5	398.3	3040.0
	RFA	2048.8	1823.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	2776.6	11332.2	2048.8	1872.7	15253.6
	APAI	6.1	5.7	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	4.3	21.8	4.0	.0	27.8
	EPAI	10.6	10.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	9.2	45.0	7.1	.0	55.6
	TA	489.7	98.6	.0	.0	.0	.0	39.0	17.3	.0	63.6	25.5	.0	6.6	412.7	9.3	37.2	982.2
	BA	66.7	40.0	.0	.0	.0	.0	26.7	13.3	.0	13.3	13.3	.0	13.3	145.1	13.3	26.7	265.1
TOTALS	CFA	1486.9	857.9	.0	.0	.0	.0	808.9	451.1	.0	111.4	280.8	.0	504.9	3255.3	409.5	705.4	6179.5
	RFA	3792.4	3478.0	.0	.0	.0	.0	3780.6	2125.6	.0	.0	972.2	.0	2776.6	14710.5	2048.8	2998.5	24599.2
	APAI	75.3	11.7	.0	.0	.0	.0	12.6	12.6	.0	6.0	10.7	.0	4.3	53.9	4.0	.0	152.5
	EPAI	79.9	31.5	.0	.0	.0	.0	23.6	12.6	.0	10.5	10.7	.0	9.2	92.6	7.1	.0	195.8

Exhibit 2 continued

OTHER INSECT AND DAMAGING PROBLEM SURVEY 3/20/80

----------SPECIES TOTAL----------

RO TEST 1 100

DIAMETER CLASS		UNDAM. STAND	SHOOT INSECT	STEM BORER	GALL INSECT	SCALES, APHID	WEB-WORMS	LIGHT WIN. DAM.	MOD. WIN. DAM.	HEAVY WIN. DAM.	ANIMAL DAM.	SPIKE TOPS	OTHER I+D PROB.	OTHER DAM. AGENTS	OTHER MORT.	STAND TOTAL
	TA	300.0	100.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	100.0	.0	.0	500.0
1- 4.9	BA	.0	12.6	.0	.0	.0	.0	.0	.0	.0	.0	.0	12.6	.0	.0	25.1
	TA	158.6	.0	.0	52.9	.0	.0	.0	.0	.0	.0	.0	63.6	.0	.0	275.1
	BA	40.0	.0	.0	13.3	.0	.0	.0	.0	.0	.0	.0	13.3	.0	.0	66.7
5- 8.9	CFA	703.3	.0	.0	177.7	.0	.0	.0	.0	.0	.0	.0	111.4	.0	.0	992.3
	BFA	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	APAI	54.9	.0	.0	15.1	.0	.0	.0	.0	.0	.0	.0	6.0	.0	.0	76.0
	EPAI	54.9	.0	.0	15.1	.0	.0	.0	.0	.0	.0	.0	10.5	.0	.0	80.5
	TA	21.8	.0	.0	20.6	.0	.0	.0	.0	.0	.0	.0	85.1	.0	21.8	128.6
	BA	13.3	.0	.0	13.3	.0	.0	.0	.0	.0	.0	.0	53.3	.0	13.3	80.0
9-11.9	CFA	374.1	.0	.0	376.3	.0	.0	.0	.0	.0	.0	.0	1466.0	.0	307.1	2147.2
	BFA	1743.7	.0	.0	1723.3	.0	.0	.0	.0	.0	.0	.0	6476.1	.0	1125.7	9345.5
	APAI	14.3	.0	.0	11.0	.0	.0	.0	.0	.0	.0	.0	34.3	.0	.0	48.6
	EPAI	14.3	.0	.0	11.0	.0	.0	.0	.0	.0	.0	.0	45.3	.0	.0	59.6
	TA	9.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	9.3	44.6	9.3	15.4	78.6
	BA	13.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.3	53.3	13.3	13.3	93.3
2 +	CFA	409.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	480.6	1751.6	409.5	398.3	3040.0
	BFA	2048.8	.0	.0	.0	.0	.0	.0	.0	.0	.0	2445.7	8886.4	2048.8	1872.7	15253.6
	APAI	6.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	7.7	14.0	4.0	.0	27.8
	EPAI	10.6	.0	.0	.0	.0	.0	.0	.0	.0	.0	7.7	37.3	7.1	.0	55.6
	TA	489.7	100.0	.0	73.4	.0	.0	.0	.0	.0	.0	9.3	293.2	9.3	37.2	982.2
	BA	66.7	12.6	.0	26.7	.0	.0	.0	.0	.0	.0	13.3	132.6	13.3	26.7	265.1
TALS	CFA	1486.9	.0	.0	553.9	.0	.0	.0	.0	.0	.0	480.6	3328.9	409.5	705.4	6179.5
	BFA	3792.4	.0	.0	1723.3	.0	.0	.0	.0	.0	.0	2445.7	15362.5	2048.8	2998.5	24599.2
	APAI	75.3	.0	.0	26.1	.0	.0	.0	.0	.0	.0	7.7	54.3	4.0	.0	152.5
	EPAI	79.9	.0	.0	26.1	.0	.0	.0	.0	.0	.0	7.7	93.1	7.1	.0	195.8